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| 10/621,929 | 07/16/2003 | Enrique Saldivar Guerra | CID001/1-US | 8513 |

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| EXAMINER |
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LEE, RIP A

| ART UNIT | PAPER NUMBER |
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1713

DATE MAILED: 03/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/621,929

Applicant(s)

SALDIVAR GUERRA ET AL.

Examiner

Rip A. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-88 is/are pending in the application.
- 4a) Of the above claim(s) 59-88 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 45-49, 51-53 and 55-58 is/are allowed.
- 6) ☒ Claim(s) 1-22 and 24-44 is/are rejected.
- 7) ☒ Claim(s) 1, 3, 4, 16, 20, 23, 31, 32, 34-36, 50 and 54 is/are objected to.
- 8) ☒ Claim(s) 1-88 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>07-16-2003</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Election/Restrictions

1. Claims 59-88 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected claims, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on July 11, 2005.

Claim Objections

2. Claim 1 is objected to because of the following informalities: Line 5 of the claim refers to "the chain." This term needs to be qualified since it is not clear to which chain the recitation refers. Use of "the resulting polymer chain" is suggested. Appropriate correction is required.

3. Claims 3, 4, 16, 20, 23, 31, 35, and 36 are objected to because of the following informalities: The claims recite the terms, "larger than about," "smaller than about," "at least about," "less than about," and "greater than about," all of which represent open-ended ranges. The terms are unclear because it is not clear where the upper or lower bound of the range lies exactly. See MPEP § 2173.05(b)(4). Appropriate corrections are required.

4. Claims 31, 32, 35, and 36 are objected to because of the following informalities: The type of molecular weight has not been specified, thereby rendering the scope of the claims unclear. Appropriate corrections are required.

5. Claim 34 is objected to because of the following informalities: Line 7 of the claim recites the term "using," which places the claim in "use claim" format. Replacing "using" with "wherein" and replacing "of" with "is" is suggested. Appropriate correction is required.

6. Claims 50 and 54 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite

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the claims in independent form. Since parent claims 49 and 53 require step (a), dependent claims can not include a proviso statement in which step (a) is omitted from the process.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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10. Claims 1-3, 5-18, 20, 21, 24-26, 31, 33, 38, 42, and 43 are rejected under 35 U.S.C. 102(e) as being anticipated by Visger *et al.* (U.S. 6,531,547).

Example 11 of Visger *et al.* discloses a process for making a diblock styrene-styrene/maleic anhydride copolymer by polymerizing monomers in the presence of a mixture of TEMPO-OH/BPO at a temperature between 110-200 °C. The polystyrene block has $M_n = 13,423$ and $M_w = 18,731$ (corresponds to about 138 styrene units), PDI = 1.37, and the overall product has $M_n = 22,610$, $M_w = 55,687$, and PDI = 2.46 (corresponding to approximately 96 styrene or maleic anhydride units).

The amount of stable free radical is typically 0.001 to 0.01 mole/mole monomer, the initiator is used in amount of about 0.01-2 wt %, based on total reactants, and the molar ratio of stable free radical to initiator is about 5/1 to 0.5/1 (col. 7, lines 26-30 and 51-58). In the cited example, the concentration of initiator is about 0.02 M, the amount of solvent is about 29 wt %, based on total mixture of monomer and solvent, the monomer/initiator ratio is about 290/1, and the molar ratio of stable free radical to initiator is 1.00. The weight ratio of styrene to acrylic monomer, in this case, maleic anhydride, suitable for the inventive process lies in the range of about 20/1 to about 1/20 (col. 9, lines 1-4). This appears to be a non-limiting range; example 10 shows a similar process wherein the polymer has a maleic anhydride content of 1.6 wt % ($M_n = 35,015$, initiator concentration ≈ 0.17 M, 35 wt % solvent, monomer/initiator ratio $\approx 378/1$, molar ratio of stable free radical to initiator = 1.18). Use of itaconic anhydride in place of maleic anhydride is disclosed in col. 6, line 6.

11. Claims 1-14, 17-21, 33, and 38-41 are rejected under 35 U.S.C. 102(b) as being anticipated by Park *et al.* (*J. Poly. Sci., Part A: Polym. Chem.*, 2000).

Park *et al.* discloses a process of making diblock styrene-styrene/maleic anhydride copolymer by polymerizing monomers in the presence of TEMPO/BPO (1.8 mole ratio; [BPO] = 0.033 M) at a temperature of 120 °C; see entries TPSM01-TPSM07, wherein the wt % of units derived from maleic anhydride lie in the range of 0.2-17.5 wt %. In those cases where the weight percent is 0.2-5.0 wt %, the dependence of the free radical/initiator ratio upon the wt % of unsaturated cyclic anhydride, defined by the equation set forth in the instant claims, is satisfied.

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The polymers have a styrene rich block and a styrene-*co*-MA block (page 2242). The weight average molecular weight of polymers lies in the range of 18,900 to 37,000, and the polydispersity lies in the range of 1.23-1.62.

12. Claims 4, 19, 22, 27-37, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Visger *et al.*

The discussion of the disclosures of the prior art from the previous paragraph of this office action is incorporated here by reference. Although the molecular weight of the polymer exemplified in the prior art is 22,610, Visger *et al.* teaches that polymers having M_w up to about 100,000 may be achieved frequently (col. 10, lines 1-10). Another difference between the inventions lies in the actual amount of stable free radical and initiator used. Although example 11 shows use of an equimolar amount of free radical and initiator, one of ordinary skill in the art would have found it obvious to use a higher free radical/initiator ratio because Visger *et al.* teaches that the molar ratio of stable free radical to initiator lies in the range of about 5/1 to 0.5/1 (col. 7, lines 55-58). Thus, it is maintained that one of ordinary skill in the art would have found it obvious to arrive at the subject matter of the instant claims 4, 19, and 31-37 because these features are disclosed in Visger *et al.*

Visger *et al.* does not show use of solvent in the amounts prescribed in the instant claims for making styrene-maleic anhydride copolymers, however, other examples show use of solvent levels of 50 and 60 wt % (see examples 2 and 3). Furthermore, additional solvent is added to maintain viscosity, and clearly, the amount of solvent to be used is variable (see examples). Thus, one of ordinary skill in the art would have found it obvious to adjust the appropriate amount of solvent in order to achieve appropriate solution viscosity, and thereby arrive at the subject matter of the instant claims 27-30. Regarding claim 22, the reaction is performed at elevated temperature in a resin kettle. As such, one of ordinary skill in the art would have found it obvious that the pressure above the reaction mixture is higher than the vapor pressure of the reaction mixture itself. One of ordinary skill in the art would have found it obvious to arrive at the subject matter of claim 44 because Visger *et al.* teaches use of 0.01-2 wt % of initiator, based on the total reactants (col. 7, lines 26-30; for instance, use of 0.2 wt % of BPO initiator with

styrene/maleic anhydride monomer corresponds to a monomer/initiator mole ratio of about 1200).

Allowable Subject Matter

13. Claims 23 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to overcome claim objections set forth in paragraph 3 (*vide supra*), and if rewritten in independent form including all of the limitations of the base claim and any intervening claims. None of the cited references teaches the claimed subject matter, and one of ordinary skill in the art would not have found it obvious to arrive at the subject matter of the claims based on the teachings therein.

14. The following is a statement of reasons for the indication of allowable subject matter: Claims 45-49, 51-53, and 55-58 are allowed over the closest references cited above and over Tanaka *et al.* (U.S. 4,328,327). In particular, Tanaka *et al.* discloses a continuous bulk polymerization process that is carried out in two stages using a vertical reactor followed by a single-shaft horizontal reactor. The process results in the formation of a uniform copolymer of styrene and maleic anhydride containing a substantially constant amount of maleic anhydride. In sharp contrast, copolymers of the instant invention are block copolymers containing a styrene block and a random styrene/maleic anhydride block. Therefore, the prior art neither teaches nor remotely suggests the subject matter of claims 45-49, 51, and 52. Tanaka *et al.* also fails to teach steps (a) to (c), recited in instant claims 49, 51-53, and 55-58.

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Prior Art

The prior art made of record but not relied upon is considered pertinent to the Applicant's disclosure.

Fischer *et al.* (U.S. 6,239,226) teaches use of a combination of free radical initiator and *N*-oxyl radical for preparing block copolymers which contain low T_g acrylates and a monomer selected from styrene, (meth)acrylonitrile, (meth)acrylates, or maleic anhydride.

Bertin (U.S. 6,911,511) teaches use of a combination of TEMPO and peroxide for preparation of styrene-(meth)acrylate grafted or block copolymers.

* Hong *et al.* (U.S. 2005/0004310) teaches preparation of poly(styrene-*co*-maleic anhydride)-*block*-polystyrene copolymers in the presence of AIBN/TEMPO mixture. The publication has a filing date of December 17, 2003, which does not antedate Applicant's priority date of July 19, 2002. Therefore, this reference does not qualify as prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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February 16, 2006



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